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XXXII. *Observations made at Leicester on
the Transit of Venus over the Sun, June 3,
1769. By the Reverend Mr. Ludlam,
Vicar of Norton, near Leicester.*

Read Nov. 16, 1769. **T**H E telescope, used for viewing the planet, was made by Mr. Dollond, with a triple object glass of $33\frac{1}{3}$ inches focal distance, and was found by experiment to magnify 54 times. The clock was firmly fixed; its pendulum rod was made of wood. The transit telescope was not accurately adjusted either to the meridian or horizon, but the transits of the Sun and of η Bootis registered below are sufficient to show the rate of the going of the clock, and the corresponding altitudes of the Sun, its error a few days before the transit of the planet; whence the necessary reduction of the time then shewn by the clock to apparent time may be easily derived.

Observations for examining the clock.

TRANSITS.									
Day of the month, 1769.	First Wire.	Time by the Clock.			Third Wire	Object			
		h	m	s					
May 28	17 12	ix	18	0	18 47½	Bootis			
	Clouds	Clouds			Clouds	Sun			
	Clouds	xxiiii	59	1	59 50				
29	13 19½	ix	14	7½	14 54	Bootis			
31	56 29	xxiiii	57	17½	58 6½	Sun			
	58 46	59 35			0 23½				
June 1	56 39	xxiiii	57	28½	58 17	Sun			
	58 56	59 46			0 34				
	57 43½	viii	58	32	59 19	Bootis			

Corresponding altitudes of the Sun, taken by reflection from water, with an Hadley's quadrant of six inches radius.

Sun's double alt. $79^{\circ} 54'$

May 29, 1769

	Time by the Clock		
	Eastern Az.	Western Az.	Meridian
	h	m	s
Up. limb	viii	28 33	111 27 39
Center	30 17½	25 51½	xi 58 6
Low. limb	32 8	23 57½	4½
Mean			2¾
			xi 58 4½

Sun's

Sun's double alt. $82^{\circ} 55'$

May 29, 1769

Time by the Clock		
Eastern Az.	Western Az.	Meridian
h' "	h' "	h' "
Up. limb VIII 39 0	III 17 8	XI 58 4
Center 40 51 $\frac{1}{2}$	15 18	4 $\frac{3}{4}$
Low. limb 42 42 $\frac{1}{2}$	13 25	3 $\frac{3}{4}$
Mean		XI 58 4 $\frac{1}{2}$
Mean. of both sets	h'	XI 58 4 $\frac{7}{8}$
Cor ⁿ for the interv.	7 0	7 $\frac{5}{8}$
Passage over meridian		XI 57 56 $\frac{2}{3}$
Equat. of time		3 3
Clock faster than mean time		59 $\frac{2}{3}$

Sun's double alt. $96^{\circ} 58'$

June 2, 1769

Time by the Clock.		
Eastern Az.	Western Az.	Meridian
h' "	h' "	h' "
Up. limb IX 27 50	II 29 44	XI 58 47
Center 29 57	27 41	49
Low. limb 32 1 $\frac{1}{2}$	25 36	48 $\frac{3}{4}$
Mean	h'	XI 58 48,25
Cor ⁿ for interv.	5 0	5,65
Passage over meridian		XI 58 42,6
Equat. of time		2 28,4
Clock faster than mean time		1 11

If we suppose the clock to be $1' 11''$ faster than mean time, on June the second at noon, and to gain at the rate of $2\frac{1}{2}$ seconds in a day, then at the time of the transit of the planet it was one minute and one second slower than apparent time.

At VII^h 6' 0'', according to the time shewn by the clock, a small indenture appeared on the Sun's limb; the increase of it at VII^h 6' 14'', shewed plainly that it was made by the expected planet.

The

The internal contact was first noted at $\text{VII}^{\text{h}} 23' 56''$; at $\text{VII}^{\text{h}} 24' 8''$, the divided part of the Sun's limb seemed wholly united.

The edge both of the Sun and Planet were in a continual tremor; at the internal contact the limb of the Sun seemed, for several seconds, to be alternately united and again separated by a kind of shootings of the Planet.

These observations, reduced to apparent time, give the external contact at $\text{VII}^{\text{h}} 7' 1''$, the internal contact at $\text{VII}^{\text{h}} 25' 9''$, the duration $18' 8''$.

The solar eclipse was observed by the same clock and telescope. It was manifestly begun at $\text{XVIII}^{\text{h}} 34' 26''$, according to the time shewn by the clock. The ending was exactly noted at $\text{XX}^{\text{h}} 20' 8''$. The Sun's limb appeared very well defined all the morning. These observations, reduced to solar time, make the beginning of the eclipse at $\text{XVIII}^{\text{h}} 35' 21''$, the end at $\text{XX}^{\text{h}} 21' 2''$, the duration $1^{\text{h}} 45' 41''$.

Observations made at Leicester, with an Hadley's quadrant, of six inches radius, for determining the latitude of the place.

		°	'
April 27	Sun's diameter on quadrantal arch on arch of excess repeated on quad. arch on arch of excess	32	33
		32	32
		32	32
	Sum of the meridian altitude of the Sun's upper limb, and its depression, when reflected by water of the lower limb		
29	Sun's diameter on quadrantal arch	103	$20\frac{1}{2}$
		102	18
		$32\frac{1}{2}$	
			April

1769 April 29	Sun's diameter on arch of excess repeated on quadrantal arch on arch of excess	° 32 33 32 +
	Merid. alt. and depression of Sun's upper limb, reflected by water	104 36
	of the lower limb	103 31
June 11	Sun's diameter on quadrantal arch on arch of excess	33 30
	repeated on quad. arch	33
	on arch of excess	30
	Merid. alt. and depression of Sun's upper limb, reflected by water	121 36 $\frac{1}{2}$
	of the lower limb	120 33
15	Sun's diameter on quad. arch on arch of excess	33 $\frac{1}{2}$
	repeated on quad. arch	30
	on arch of excess	33 $\frac{1}{2}$
	Merid. alt. and depress. of Sun's upper limb, re- flected by water	122 2 $\frac{1}{2}$
	of the lower limb	121 59 $\frac{1}{2}$

The latitude of Leicester, deduced from the ob-
servations of April 27, is
of April 29,
of June 11,
of June 15,

Mean of these four observations

The latitude of Market Harborough, in Lei-
cestershire, from the mean of several accurate
observations of the Sun's image, projected in-
to a dark room, by S. Rouse

°	'	"
52	36	21
52	37	3
52	37	35
52	37	12
—	—	—
52	37	3
—	—	—
52	28	30